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12/20/2001

Victor Tan Cher 'Khng

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EXAMINER

GRAYBILL, DAVID E

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 11/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/023,049

Applicant(s)

CHER 'KHNG ET AL.

Examiner

David E. Graybill

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-17 and 58-64 is/are pending in the application.
- 4a) Of the above claim(s) 3 and 6-8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,9-17 and 58-64 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9-26-5 has been entered.

Claims 1-8, 14-17 and 62-64 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The undescribed subject matter is the claims 1, 14 and 62 language, "about 0.1 mm to 1.4 mm. Specifically, the language "about" is not described.

In the rejections *infra*, generally, reference labels are recited only for the first recitation of identical claim elements.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 1, 4, 5, 14-17 and 62-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yew (6137164).

At column 4, line 52 to column 6, line 37; column 7, lines 3-18; and Abbot (6337445), incorporated by reference; column 7, line 33 to column 8, line 67; column 9, line 17-22; column 10, lines 1-12; column 11, lines 16-20 and 38-50, Yew discloses the following:

A semiconductor package comprising: a substrate 420 comprising a first side, an opposing second side, a plurality of die contacts 411, 630 on the first side, and a plurality of bonding sites 634 on the second side in electrical communication with the die contacts, each bonding site comprising an electrically conductive, bondable metal; a semiconductor die 401 on the first side comprising a plurality of bond pads 633 bonded to the die contacts;

and a plurality of external contacts 630 on the second side, each external contact comprising a multi layered metal bump 805 (Abbott) including a first metal layer 801 on a bonding site, a second metal layer 802 on the first metal layer, and a non-oxidizing outer layer 803 on the second metal layer; each external contact having a height H on the substrate equal to a combined thickness of the bonding site, the first metal layer, the second metal layer and the outer layer; wherein the electrically conductive, bondable metal comprises copper "copper traces having a gold flash," the first metal layer comprises copper, the second metal layer comprises nickel, and the non-oxidizing outer layer comprises gold; wherein the substrate comprises a material selected from the group consisting of organic polymer materials, epoxy resins "FR-4," and polyimide resins.

A semiconductor package comprising: a substrate having a first side, and an opposing second side; a plurality of die contacts on the first side comprising first multi layered metal bumps in a pattern having generally planar first tip portions (illustrated in FIG. 6A); a plurality of bonding sites on the second side in an array in electrical communication with the die contacts, each bonding site comprising an electrically conductive, bondable metal 634; a plurality of external contacts on the bonding sites in electrical communication with the die contacts comprising second multi layered metal bumps having generally planar second tip portions (illustrated in FIG. 6A)

configured to facilitate bonding of the package to a supporting substrate, the external contacts having a height H on the substrate; and a semiconductor die flip chip 401 mounted to the substrate, the die comprising a plurality of bond pads in the pattern bonded to the die contacts; wherein each first multi layered metal bump and each second multi layered metal bump comprises a copper layer 801, a nickel layer 802 and a gold layer 803; an encapsulant 450 on the substrate encapsulating the die; wherein the bonding sites and the external contacts are in a grid array.

An electronic assembly comprising: a supporting substrate comprising a plurality of electrodes; and a semiconductor package comprising a substrate having a first side and an opposing second side, a plurality of die contacts on the first side comprising first multi layered metal bumps having generally planar first tip portions, a plurality of bonding sites on the second side in electrical communication with the die contacts comprising an electrically conductive bondable metal, a semiconductor die bonded to the die contacts in a flip chip configuration, and a plurality of external contacts on the bonding sites comprising second multi layer metal bumps having generally planar second tip portions bonded to the electrodes; each external contact having a height H on the substrate equal to a combined thickness of a bonding site and a multi layer metal bump; wherein each die contact

comprise a copper layer, a nickel layer and a gold layer; wherein each external contact comprise a copper layer, a nickel layer and a gold layer.

To further clarify the disclosure of an inherent solder mask 450 on the second side inherently configured to electrically insulate the external contacts, it is noted that the language "solder mask" and "to electrically insulate the external contacts" are statements of intended use that do not appear to result in a structural difference between the claimed solder mask and 450. Further, because 450 appears to have the same structure as the claimed solder mask, it appears to be inherently capable of being used for the intended uses, and the statements of intended use do not patentably distinguish the claimed solder mask from 450. The manner in which a product operates is not germane to the issue of patentability of the product; Ex parte Wikdahl 10 USPQ 2d 1546, 1548 (BPAI 1989); Ex parte McCullough 7 USPQ 2d 1889, 1891 (BPAI 1988); In re Finsterwalder 168 USPQ 530 (CCPA 1971); In re Casey 152 USPQ 235, 238 (CCPA 1967). And, claims directed to product must be distinguished from the prior art in terms of structure rather than function. In re Danley, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does [or is intended to do]." Hewlett-Packard Co. v. Bausch & Lomb Inc., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990). In any case, 450 is inherently configured to electrically insulate the external contacts because, as cited, it is disclosed as

electrically insulating. Therefore, it inherently electrically insulates the external contacts at least from the space in which it occupies.

However, Yew does not appear to explicitly disclose the height H selected to reduce an overall thickness T1 of the package to between about 0.1 mm to 1.4 mm.

Nonetheless, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that, in view of the applied prior art, the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).



Claims 1, 4, 5, 14-17 and 62-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yew as applied to claims 1, 4, 5, 14-17 and 62-64 *supra*, and further in combination with Yoneda (20030006503).

Yew does not appear to explicitly disclose the height H selected to reduce an overall thickness T1 of the package to between about 0.1 mm to 1.4 mm.

Nevertheless, at paragraph 470, Yoneda discloses that external contact height and package thickness are result effective variables. Furthermore, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed height and thickness limitations because applicant has not disclosed that, in view of the applied prior art, the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears *prima facie* that the process would possess utility using another height and thickness. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See MPEP 2144.05(II): "Generally, differences in concentration or temperature will not support the patentability of subject matter

encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. '[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.'" In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969), Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989), and In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990). As set forth in MPEP 2144.05(III), "Applicant can rebut a prima facie case of obviousness based on overlapping ranges by showing the criticality of the claimed range. 'The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.' In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results."

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yew or Yew and Yoneda as applied to claim 1 supra, and further in combination with Hanaoka (20020030245).

Yew and the combination of Yew and Yoneda do not appear to explicitly disclose that the external contacts are generally pyramidal in shape with planar tip portions.

Regardless, at paragraphs 130, 166 and 201-209, Hanaoka discloses external contacts 14 generally pyramidal in shape with planar tip portions; each external contact comprising a multi layered metal bump including a first metal layer, a second metal layer on the first metal layer, and a non-oxidizing outer layer on the second metal layer. To further clarify the disclosure of a base metal layer, a bump metal layer and a non-oxidizing outer metal layer as cited, Hanaoka discloses, "as a conductive material for forming the conductive layer 8. [sic] a plurality of different kinds of metals (Ni+Cu or Ni+Au+Cu, for example) may be used. Thereby, the conductive layer 8 may be formed of multiple layers." Hence, Hanaoka discloses the range of three metal layers: Ni, Au and Cu, in any order, and this range encompasses the claimed embodiment. Therefore, the range of Hanaoka anticipates the claimed embodiment. In addition, it would have been obvious to combine this disclosure of Hanaoka with the disclosure of the applied prior art because it would reduce package size and increase package reliability.

Claims 9-12 and 58-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yew (6137164), and further in combination with Hanaoka (20020030245).

As cited supra, Yew discloses the following:

A semiconductor package comprising: a substrate having a first side and an opposing second side; a plurality of die contacts on the first side in a pattern, and a plurality of external contacts on the second side in an array in electrical communication with the die contacts, each die contact and each external contact comprising a multi layered metal bump having a planar tip portion configured to facilitate bonding to the substrate, each die contact and each external contact including a base metal layer 801 on a bonding site, a bump metal layer 802 on the base metal layer and a non-oxidizing outer metal layer 803 on the bump metal layer; and a semiconductor die flip chip 401 mounted to the first side, the die comprising a plurality of bond pads in the pattern bonded to the die contacts; an encapsulant 450 on the substrate encapsulating the die and the first side; wherein the base metal layer comprises copper, the bump metal layer comprises nickel, and the non-oxidizing outer metal layer comprises gold; an inherent solder mask 450 on the second side inherently configured to electrically insulate the external contacts.

An electronic assembly comprising: a supporting substrate 402 comprising a plurality of electrodes 633; at least one semiconductor package on the supporting substrate comprising: a substrate 420 comprising a plurality of bonding sites, each bonding site comprising an electrically conductive, bondable metal; a semiconductor die on the substrate comprising a plurality of bond pads in electrical communication with the bonding sites; and a plurality of external contacts on the bonding sites bonded to the electrodes on the substrate, each external contact comprising multi layered metal bump having a planar tip portion configured to facilitate bonding to an electrode on the supporting substrate, each external contact including a first metal layer on a bonding site, a second metal layer on the first metal layer, and a non-oxidizing outer layer on the second metal layer; wherein the substrate and the package are configured as a multi chip module; wherein the first metal layer comprises copper, the second metal layer comprises nickel, and the non-oxidizing outer layer comprises gold; wherein the package further comprises a plurality of die contacts on the substrate in electrical communication with the external contacts, the die contacts comprising multi layer metal bumps bonded to the bond pads on the die.

However, Yew does not appear to explicitly disclose a generally pyramidal shaped bump.

Regardless, as cited supra, Hanaoka discloses a generally pyramidal shaped bump, and Hanaoka is applied for the reasons it was applied in combination with Yew supra.

Also, Yew and Hanaoka does not appear to explicitly disclose that a height H of each die contact and each external contact is about 5  $\mu\text{m}$ .

Nonetheless, at paragraphs 36, 104, 119, 181 and 195, Hanaoka discloses that package size is a result effective variable. In addition, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed height limitations because applicant has not disclosed that, in view of the applied prior art, the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another height. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See MPEP 2144.05(II): "Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. '[W]here the

general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”

In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969), Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989), and In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990). As set forth in MPEP 2144.05(III), “Applicant can rebut a prima facie case of obviousness based on overlapping ranges by showing the criticality of the claimed range. ‘The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.’ In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results.” As also reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that, in view of the applied prior art, the dimensions are for a particular unobvious purpose, produce an unexpected

result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yew and Hanaoka as applied to claim 12 supra, and further in combination with Yoneda (20030006503).

Yew and Hanaoka do not appear to explicitly disclose a height H of each die contact and each external contact is about 5  $\mu\text{m}$ .

Notwithstanding, at paragraph 470, Yoneda discloses that contact height is a result effective variable. Furthermore, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed height limitations because applicant has not disclosed that, in view of the applied prior art, the limitations are for a particular unobvious purpose,



produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another height. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See MPEP 2144.05(II): "Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. '[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.'" In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969), Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989), and In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990). As set forth in MPEP 2144.05(III), "Applicant can rebut a prima facie case of obviousness based on overlapping ranges by showing the criticality of the claimed range. 'The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected

results relative to the prior art range.’ In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results.”

Claims 9-11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanaoka (20020030245).

At paragraphs 130, 166 and 201-209, Hanaoka discloses a semiconductor package comprising: a substrate 6 having a first side and an opposing second side; a plurality of die contacts 14 on the first side in a pattern, and a plurality of external contacts 14 on the second side in an array in electrical communication with the die contacts, each die contact and each external contact comprising a generally pyramidal shaped multi layered metal bump having a planar tip portion configured to facilitate bonding to the substrate, each die contact and each external contact including a base metal layer on a bonding site, a bump metal layer on the base metal layer and a non-oxidizing outer metal layer on the bump metal layer; and a semiconductor die flip chip 6 mounted to the first side, the die comprising a plurality of bond pads 14 in the pattern bonded to the die contacts; an encapsulant 26 on the substrate encapsulating the die and the first side; wherein the base metal layer comprises copper, the bump metal layer comprises nickel, and the non-oxidizing outer metal layer comprises gold;

and a solder mask 26 on the second side configured to electrically insulate the external contacts.

To further clarify the disclosure of a base metal layer, a bump metal layer and a non-oxidizing outer metal layer wherein the base metal layer comprises copper, the bump metal layer comprises nickel, and the non-oxidizing outer metal layer comprises gold, as cited, Hanaoka discloses, "as a conductive material for forming the conductive layer 8. [sic] a plurality of different kinds of metals (Ni+Cu or Ni+Au+Cu, for example) may be used. Thereby, the conductive layer 8 may be formed of multiple layers." Hence, Hanaoka discloses the range of three metal layers: Ni, Au and Cu, in any order, and this range encompasses the claimed embodiment. Therefore, the range of Hanaoka anticipates the claimed embodiment.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hanaoka (20020030245).

Hanaoka is applied as applied to claim 9 supra.

However, Hanaoka does not appear to explicitly disclose that a height H of each die contact and each external contact is about 5  $\mu\text{m}$ .

Notwithstanding, at paragraphs 36, 104, 119, 181 and 195, Hanaoka discloses that package size is a result effective variable. In addition, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing

constraints and ascertainable by routine experimentation and optimization to choose the particular claimed height limitation because applicant has not disclosed that, in view of the applied prior art, the limitation is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the process would possess utility using another height. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See MPEP 2144.05(II): "Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. '[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.'" In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969), Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989), and In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990). As set forth in MPEP 2144.05(III), "Applicant can rebut a prima facie case of obviousness based on overlapping ranges by showing the criticality of the claimed range. 'The law is replete with cases in which the

difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.’ In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results.”

As also reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that, in view of the applied prior art, the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hanaoka as applied to claim 12 *supra*, and further in combination with Yoneda (20030006503).

Hanaoka does not appear to explicitly disclose that a height H of each die contact and each external contact is about 5  $\mu\text{m}$ .

Nevertheless, at paragraph 470, Yoneda discloses that contact height is a result effective variable. Furthermore, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed height limitation because applicant has not disclosed that, in view of the applied prior art, the limitation is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another height. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See MPEP 2144.05(II): "Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. '[W]here the general conditions of a claim are disclosed in the prior

art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969), Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989), and In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990). As set forth in MPEP 2144.05(III), “Applicant can rebut a prima facie case of obviousness based on overlapping ranges by showing the criticality of the claimed range. ‘The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.’ In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results.”

Applicant's remarks filed 9-16-5 have been fully considered and are adequately addressed by the rejections supra.

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**Alternatively, applicant may contact the File Information Unit at (703) 308-2733. Telephone status inquiries should not be directed to the examiner. See MPEP 1730VIC, MPEP 203.08 and MPEP 102.**

Any other telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (571) 272-1930. Regular office hours:

Monday through Friday, 8:30 a.m. to 6:00 p.m.

The fax phone number for group 2800 is (571) 273-8300.

A handwritten signature in black ink, appearing to read 'D.E. Graybill', is positioned above the printed name.

David E. Graybill  
Primary Examiner  
Art Unit 2822

D.G.

22-Nov-05